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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,137	09/19/2001	Kazushi Nomura	35.C15809	8430

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EXAMINER
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MACCHIAROLO, PETER J

ART UNIT	PAPER NUMBER
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2875

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/955,137

Applicant(s)

NOMURA, KAZUSHI

Examiner

Peter J Macchiarolo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 16-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 16-19 is/are allowed.
- 6) ☐ Claim(s) 1-9, 20-22, 24-28 and 30 is/are rejected.
- 7) ☒ Claim(s) 23 and 29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to RCE/Amendment***

1. The reply filed on 11/10/2003 consists of changes to the specification and claims, and further, the reply consists of remarks related to the prior rejection of claims in the previous Office Action. The request for continued examination filed 01/09/2004 is acceptable and an RCE has been established. However, claims 1-9, 20-22, 24-28 and 30 are not allowable as explained below. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**2. Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al (USPN 4,956,578; “Shimizu”).**

3. In regards to claim 1, the Examiner asserts that as broadly as can be interpreted, Shimizu anticipates claim 1. In figures 2 and 8A, Shimizu shows an electron-emitting apparatus comprising an electron-emitting device including a first electrode (14), a second electrode (2) that is provided so as to be insulated from the first electrode, and an electron- emitting film (4) attached to the second electrode and insulated from the first electrode via an insulating material (13); and an anode (9) provided at a predetermined distance from the electron- emitting film, wherein the first electrode, the second electrode, and the electron- emitting film oppose the

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anode, such that a distance between the anode and the electron-emitting film is longer than a distance between the anode and the second electrode, and a distance between the anode and the first electrode is longer than the distance between the anode and the electron-emitting film.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**4. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Iwase et al. (USPN 6,135,839; "Iwase").**

5. In regards to claims 2-5, Shimizu shows that potentials are applied to the anode (6), and to the first and second electrodes (3).

6. Shimizu is silent to specific values of the potentials.

7. However, Iwase teaches in figure 10, that electrons are emitted from the electron emitting film, and that a first voltage potential is applied to the anode is equal to or higher than a voltage potential applied to the first electrode and the second electrode, and this configuration improves emission efficiency. Iwase further teaches there is a second voltage potential applied between the first electrode and the second electrode, and if a voltage potential applied to the first electrode is below a potential to the second electrode, no electrons will be emitted, and this

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configuration allows a user to properly control the electron emitter<sup>1</sup>. One would be motivated to construct this configuration for a variety of reasons, including material availability and efficient operation.

8. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting apparatus of Shimizu, including Iwase's voltage applying means.

**9. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu in view of Kawate et al (USPN 5,770,918; "Kawate").**

10. In regards to claims 6-9, Shimizu discloses all of the recited limitations of claim 1 (above).

11. Shimizu is silent to the electron-emitting film including carbon or a carbon compound.

12. However, Kawate discloses that an electron-emitting film includes graphite.<sup>2</sup> Kawate further discloses in figure 8, the electron source is formed by arranging a plurality of electron-emitting apparatuses (74), and emits electrons from at least one of the plurality of electron-emitting apparatuses according to an input signal, with an image forming member (83) on which an image is formed by irradiation with electrons emitted from the electron source, and this configuration can effectively minimize the change in the positions and the contour of its fluorescing spots and, at the same time, has satisfactory mechanically securing strength and electric connectability<sup>3</sup>, therefore, motivating one skilled in the art to construct such a device.

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<sup>1</sup> Iwase, col. 11 ll. 58-65.

<sup>2</sup> Kawate, col. 10, ll. 18-25.

<sup>3</sup> Kawate, col. 3, ll. 55-60.

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13. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct Shimizu's electron emitter with Kawate's film.

**14. Claims 20-22, 24-26, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al (USPN 5,185,554; "Nomura") in view of Xu et al. (USPN 5,973,444; "Xu").**

15. In regards to claims 20, 22, 24-26, 28, and 30, Nomura discloses in figures 4d and 4e, a first electrode (32) arranged on a surface of a substrate (31), an insulating layer (33) arranged on the first electrode, a second electrode (35) arranged on the insulating layer, and an electron emitting film (39) which consists of an organic palladium compound electron emitter being arranged on the second electrode, wherein a distance between the first electrode and the anode is larger than a distance between the second electrode and the anode. Nomura further discloses the electron-emitting device emits electrons from at least one of the plurality of electron-emitting apparatuses according to an input signal to an image forming member on which an image is formed.<sup>4</sup>

16. Nomura is silent to the electron-emitting film being comprised of fibers including carbon as a main ingredient.

17. However, Xu teaches in figure 1 that an electron field emission device (10) may have carbon fiber emitters (20) arranged on an electrode (14) to improve emission characteristics. Xu further teaches that these carbon fiber emitters include multiple-walled tubular structures that

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<sup>4</sup> Nomura, col. 1, ll. 42-53.

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preferably have an average diameter from about 20 nm to about 200nm.<sup>5</sup> Xu further teaches these carbon fibers have many advantages over typical electron emitters, for instance, the fibers are more stable than the previous structures and do not contaminate easily under normal working conditions, the structures have a low work function allowing electron emission in low electric fields, and carbon fibers are more robust<sup>6</sup>. Although Xu does not expressly label the emitters as “carbon nanotubes,” one of ordinary skill in the art will recognize Xu’s carbon fiber emitters to be multi-walled nanotubes, since Xu discloses the emitters are tubular structures having an average diameter from about 20nm to about 200nm.

18. Although Nomura and Xu are both silent to the exact configuration of the power sources for applying the necessary electric fields, having Applicant’s recited power source wiring is an obvious configuration for an operable electron emitting apparatus. One would be motivated to wire an electron emitting device in such a configuration for a variety of reasons, including material availability, space requirements, and the presence of delicate elements with stringent power requirements.

19. Further, this wiring configuration is obvious to one skilled in the art since this is a mere rearrangement of parts and a matter of design choice. *In re Japikse*, 86 USPQ 70.

20. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the electron emitting device of Nomura with Xu’s electron emitting film and having Applicant’s recited wiring configuration.

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<sup>5</sup> Xu, col. 9, ll. 40-57.

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21. In regards to claims 21, and 27, Nomura and Xu teach all of the recited limitations of claim 20 but are silent to the specific voltages applied to the device (above).

22. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, one of ordinary skill in the art will arrive at Applicant's voltage relationship for this device. Further, one would be motivated to use this voltage relationship for a variety of reasons, including proper operation and control of the device and material availability.

23. Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct Nomura and Xu's electron emitting device with an anode voltage higher than a voltage applied to the first and second electrodes.

***Allowable Subject Matter***

**24. Claims 10, and 16-19 are allowed.**

**25. Claims 23 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

26. The following is a statement of reasons for the indication of allowable subject matter:

27. The prior art of record discloses an electron-emitting device as recited by Applicant, see for example Nomura, with the exception of the carbon film arranged on the second electrode

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<sup>6</sup> Xu, col. 2 ll. 22-28.

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comprising fibers that include graphenes stacked along an axial direction of the fiber. U.S.

Patent 6,654,229 to Yanagisawa et al motivates one skilled in the art to combine these fibers with Nomura, however, Yanagisawa is does not qualify as prior art. Furthermore, none of the qualifying prior art discloses or motivates one skilled in the art to construct Applicant's electron-emitting device with the electron emitting carbon film comprising fibers that include graphenes stacked along an axial direction of the fiber.

### ***Response to Arguments***

28. Applicant's arguments filed 01/28/2004 have been fully considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (571) 272-2375. The examiner can normally be reached on 8:00 - 4:30, M-F.

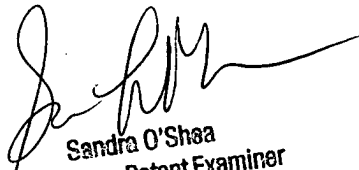
30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

31. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pjm



Sandra O'Shea  
Supervisory Patent Examiner  
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